

REMARKS/ARGUMENTS

Claims 1-26 were originally filed in the present application. In response to a Restriction Requirement made in the pending Office Action, Applicants previously elected to prosecute Group I, claims 16-26, in the present application, and has withdrawn Group II, claims 1-15, from consideration at this time; these claims have also been canceled from the present application. In prior Amendments, the Applicants amended claim 16. By the present Response, no claims are amended, added, or canceled. Accordingly, claims 16-26 remain pending in the present Application, and the Applicants respectfully request reconsideration of these claims.

L. REJECTIONS UNDER 35 U.S.C. §102

The Examiner has again rejected claims 16-18 and 20-26 under 35 U.S.C. §102(b) as allegedly anticipated by U.S. Published Patent Application No. 2004/0036164 to Koike, *et al.* The Applicants respectfully disagree with the Examiner's allegation because Koike does not disclose each and every element of independent claim 16. Specifically, Koike does not disclose a semiconductor package device having an IC chip comprising, among other things, "a final thickness less than a thickness of the package substrate on which it is mounted, wherein the final thickness is selected so that the chip distorts substantially in accordance with distortion of the package substrate occurring during temperature changes such that a shape of the chip substantially conforms to a shape of the package substrate despite the mismatch in their respective coefficients of thermal expansion."

While Koike may disclose that the IC chip may have a thickness less than a thickness of the package substrate, Koike does not disclose precisely selecting that

thickness so that the chip distorts in accordance with the package substrate during temperature changes so that the chip conforms to the same shape as the package substrate. The Examiner has again asserted that Koike's IC chip "inherently distorts, at least to some small degree, with the substrate when temperature changes." In addition, the Examiner has now cited paragraph [0074] of Koike for the proposition that because the IC chip and substrate are cured together (for the resin between them), the chip necessarily substantially conforms to the shape of package substrate. The Applicants respectfully disagree with this interpretation of Koike for several reasons.

First, while Koike does disclose the simultaneous curing of the IC chip and substrate mentioned by the Examiner, this does not address the entire limitation in independent claim 16, namely, that "the final thickness is selected so that the chip distorts substantially in accordance with distortion of the package substrate *occurring during temperature changes* such that a shape of the chip substantially conforms to a shape of the package substrate." Thus, while these components may be cured together at this point in Koike's process, Koike does not address later temperature changes that typically cause two components of different CTEs to distort different unless some affirmative step is taken to cause them to distort in the same manner and to the same degree, and thus to conform to one another. In contrast, the present claims provide for precisely selecting a final thickness of the chip so that it distorts in accordance with the substrate such that the shape of the chip substantially conforms to the shape of the substrate.

Next, the Examiner argues that "if the shape of the chip would have not substantially conform [sic] to the shape of the substrate during this temperature change, the chip would crack and become defective, it follows that the chip in fact conforms the

[sic] shape of the substrate at least to some small degree, so the chip and a result [sic] the device would not become defective.” (Office Action, page 3). This logic is error first of all because no proof is offered that the mere curing of the encapsulant is sufficient to crack a non-conforming chip in every case. In fact, millions of IC packages are formed annually using conventional encapsulation techniques, and the rampant cracking of IC chips during the encapsulating process has never been reported. This logic is also in error because Koike teaches encapsulating the entire IC chip, including its bottom, sides, and top. The entire purpose of Koike is to provide for a manufacturing process that wholly encapsulates the IC chip prior to any grinding so that it couldn’t possibly move, and thus crack, when grinding it. Thus, it is the whole encapsulation in Koike that prevents cracking, and not the final thickness of the IC chip “selected so that the chip distorts substantially in accordance with distortion of the package substrate occurring during temperature changes such that a shape of the chip substantially conforms to a shape of the package substrate,” as recited in claim 16.

Further, as just mentioned, it is clear that Koike teaches fully encapsulating the IC chip onto the substrate before any grinding ever takes place. (Koike, para. [0076]). Moreover, any grinding done is *expressly done* in Koike to fit the package device within a certain dimension, and is therefore clearly and explicitly not done to select a final thickness of the IC chip “such that a shape of the chip substantially conforms to a shape of the package substrate,” as recited in claim 16. Because Koike is clearly directed to grinding the assembled package to fit within a certain dimension, any number of material choices in Koike would result in IC chips of varying thicknesses, even though they are all formed using the same express grinding process. For example, is three different

substrate materials were selected, perhaps based on customer choices, each of these substrate materials could have different thicknesses from each other. Thus, even if the packages assembled with these different substrates were ground to the same overall thicknesses, as taught in Koike, the thickness of the IC chips in each package would differ from one another. Therefore, it cannot be said that a precise thickness for each IC chip is selected in Koike's process such that such that a shape of the chip substantially conforms to a shape of the package substrate. In stark contrast, the present claims compensate for this shortcoming by providing for the precise selection of the thickness of individual IC chips so that they distort with the specific substrate material and thickness being used to manufacture the device.

In sum, the Applicants respectfully assert that the mere chance that the chip may distort to some small degree with the package substrate does not equate to a disclosure that the final thickness of the chip is selected so that it distorts in accordance with the substrate such that the shape of the chip substantially conforms to the shape of the substrate, despite these two components having different coefficients of thermal expansion. Also, the whole encapsulation of the IC chip in Koike prior to grinding prevents chip cracking, and not a selected final thickness of the IC chip. Moreover, any grinding done in Koike is to fit the package device within a certain dimension, and is not done to select a final thickness of the IC chip, as recited in claim 16. Accordingly, Koike does not disclose all of the elements of independent claim 16, as well as its dependent claims, and the Applicants respectfully request that the Examiner withdraw these rejections.

II. REJECTIONS UNDER 35 U.S.C. §103

The Examiner has also again rejected claims 16-18 and 20-26 under 35 U.S.C. §103(a) as allegedly obvious over Koike. The Applicants also respectfully disagree with this assertion of the Examiner because Koike also does not teach or suggest all the element of independent claim 16, as herein amended. As discussed above, Koike does not teach a semiconductor package device having an IC chip comprising “a final thickness less than a thickness of the package substrate, wherein the final thickness is selected so that the chip distorts substantially in accordance with distortion of the package substrate occurring during temperature changes such that a shape of the chip substantially conforms to a shape of the package substrate despite the mismatch in their respective coefficients of thermal expansion.” Accordingly, for the reasons discussed above, the Applicants respectfully assert that independent claim 16, as herein amended, is not obvious in view of Koike. For at least these reasons, the Applicants respectively request that these rejections also be withdrawn.

Finally, the Examiner has again rejected dependent claim 19 under 35 U.S.C. §103(a) as allegedly obvious over Koike in view of U.S. Patent No. 6,559,525 to Huang. As discussed above, Koike does not teach or suggest all of the elements of amended independent claim 16, from which claim 19 depends. Huang does not provide this missing element, and is only relied upon for showing the use of a heat spreader on the IC chip. Thus, the Applicants also respectfully request that the Examiner withdraw this rejection as well.

III. CONCLUSION

The Applicants respectfully submit that pending claims 16-26 are in condition for allowance, and request a Notice of Allowability for the pending claims. The Examiner is

invited to contact the undersigned Attorney of Record if such would expedite the prosecution of the present Application three-month response deadline is set to expire on February 2, 2007. As a result, no extension fee is believed due with this filing. If any fees are determined to be due, the Applicants hereby authorize the Director to charge the necessary amount, or credit any overpayment, to Deposit Account No. 13-0480, referencing the Attorney Docket Number specified herein

Respectfully submitted,

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Date: December 11, 2006

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